

TRANSFER OF THE BRAZILIAN *TRIXIS ERYNGIOIDES* TO
PEREZIA (COMPOSITAE, MUTISIEAE)

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IN THE COURSE of a revisionary study of the South American species of the genus *Trixis* Browne (Compositae tribe Mutisieae subtribe Nassauviinae), *Trixis eryngioides* Cabrera, a species occurring in southeastern Brazil, seemed to be out of place. A careful study of this species and of all the genera of this subtribe convinces us that *Trixis eryngioides* must be transferred to the genus *Perezia* Lagasca.

A description of the plant, illustrations, pollen analysis, and discussion of the relationships of this taxon are presented here.

The abbreviations for herbaria listed in the citations of specimens are taken from the fifth edition of the *Index Herbariorum* (Lanjouw & Stafleu, 1964).

MATERIAL AND METHODS

Some of the pollen grains were acetolyzed according to the method outlined by Erdtman (1960); others were placed in 95 percent ethanol, stained with basic fuchsin, and mounted in glycerine jelly. For scanning electron microscopy (SEM) the acetolyzed pollen grains were used. After acetolysis the pollen samples were washed several times in glass-distilled water to remove traces of acids. Each sample was dispersed in a drop of ethanol (95 percent) and placed on a specimen holder. The samples were then air dried, coated with 50 Å to 100 Å carbon and about 200 Å to 300 Å gold-palladium alloy for conductivity. Finally, the specimens were photographed using a high-resolution SEM (JEOL JK II) at the Servicio de Microscopía Electrónica de Barrido del Consejo Nacional de Investigaciones Científicas y Técnicas, Buenos Aires, Argentina.

The preparation of the material for sections was made according to the Leins technique (Leins, 1968) with the modifications made by Parra and Marticorena (1972). The sections of ca. 0.5 μm . were made with an AO Spencer microtome adapted for ultrathin sections and using glass blades.

***Perezia eryngioides* (Cabrera) Crisci & Marticorena, comb. nov.**
FIGURES 1–6.

Trixis eryngioides Cabrera, Bol. Soc. Argent. Bot. 7: 196. fig. 5. 1959.

Robust rosette plants, 60–70 cm. long, erect, from a taproot. Flowering stems terete, 5–7 mm. in diameter, slightly striated, glabrate, bearing 10 to 30 cauline leaves. Cauline leaves alternate, sessile, amplexicaul, ovate-lanceolate, acute, dentate, glabrate, 6–12 cm. long, 2–2.5 cm. wide. Basal leaves usually numerous, lanceolate, acute, amplexicaul, spinulose-dentate,



FIGURE 1. *Perezia eryngioides* (from Smith & Klein 7777): A, habit of plant, $\times \frac{1}{4}$; B, capitula, $\times 1$; C, corolla, $\times 2.5$; D, achene and pappus, $\times 2.5$.

glabrate, 20–34 cm. long, 3–4 cm. wide. Inflorescence a branched terminal cyme; pedicels 1–2 cm. long, surface with glandular trichomes. Individual capitula campanulate, 10–12 mm. long, 12–15 mm. wide. Involucre hemispheric, formed by 2 rows of bracts; involucre bracts lanceolate, acute at apex, 8–12 mm. long, 1.5–2 mm. wide, abaxial surface pubescent, adaxial surface glabrous, inner bracts scarious at the base and along the margins. Receptacle slightly concave, pubescent. Flowers about 20; corolla white, bilabiate, 8–15 mm. long; tube broader toward the apex, 5–7 mm. long, 0.3 mm. in diameter at the base and 1 mm. at the apex; outer lip lanceolate, liguliform, with 4 veins, apex 3-toothed, 4–8 mm. long, 1.5–2 mm. wide; inner lip bifid, acute at apex, 2.5–3 mm. long; stamens 5, glabrous, the filaments inserted at a point halfway from the base of the tube; anthers connate, 4–4.5 mm. long, with oblong apical appendage, tailed at base. Style bifid, its branches 1–1.3 mm. long, truncate, with a crown of elongate collecting hairs at the apex, papillose with shorter hairs on the adaxial surface, glabrous on the abaxial surface. Achenes turbinate, 2.5–3

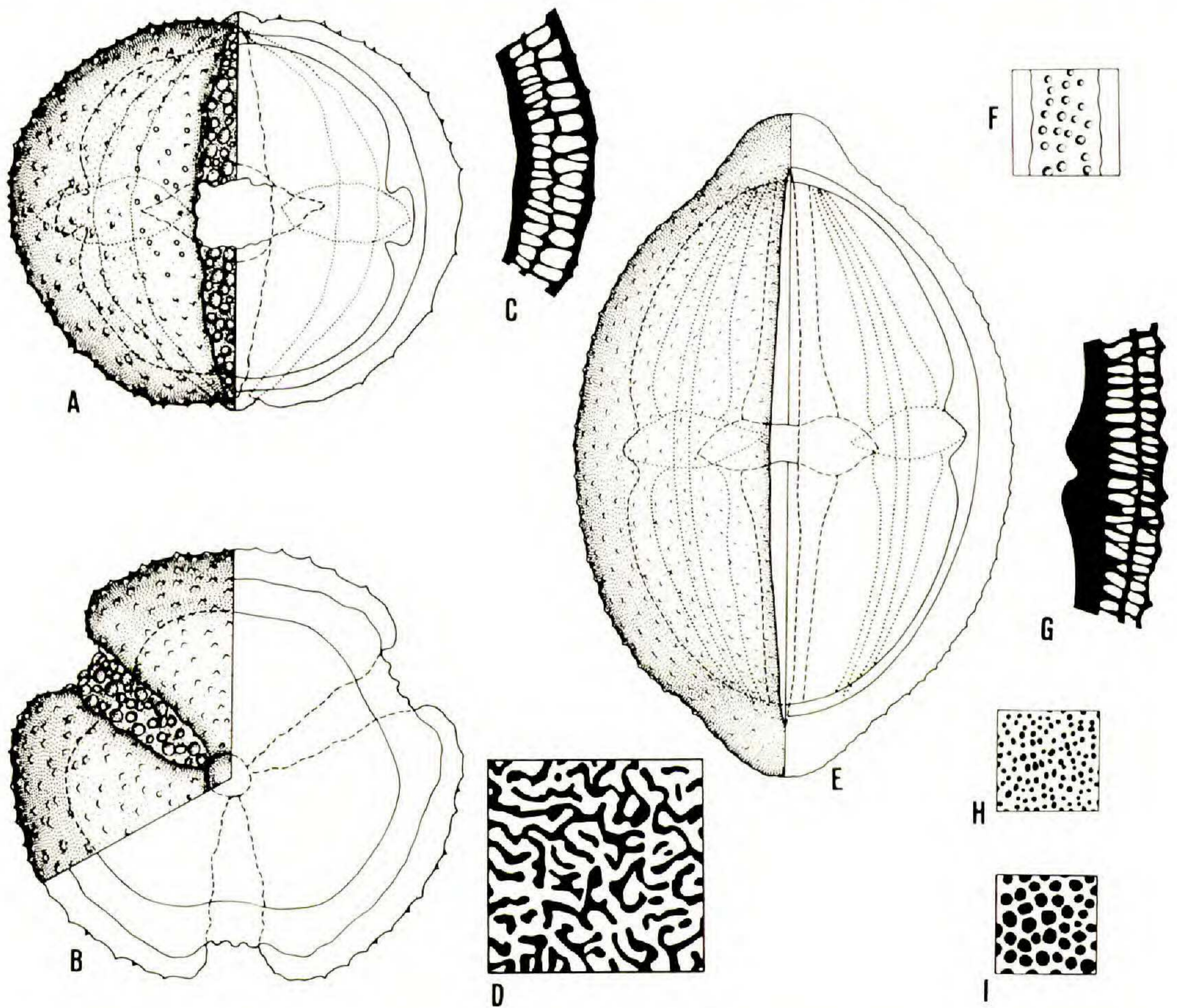
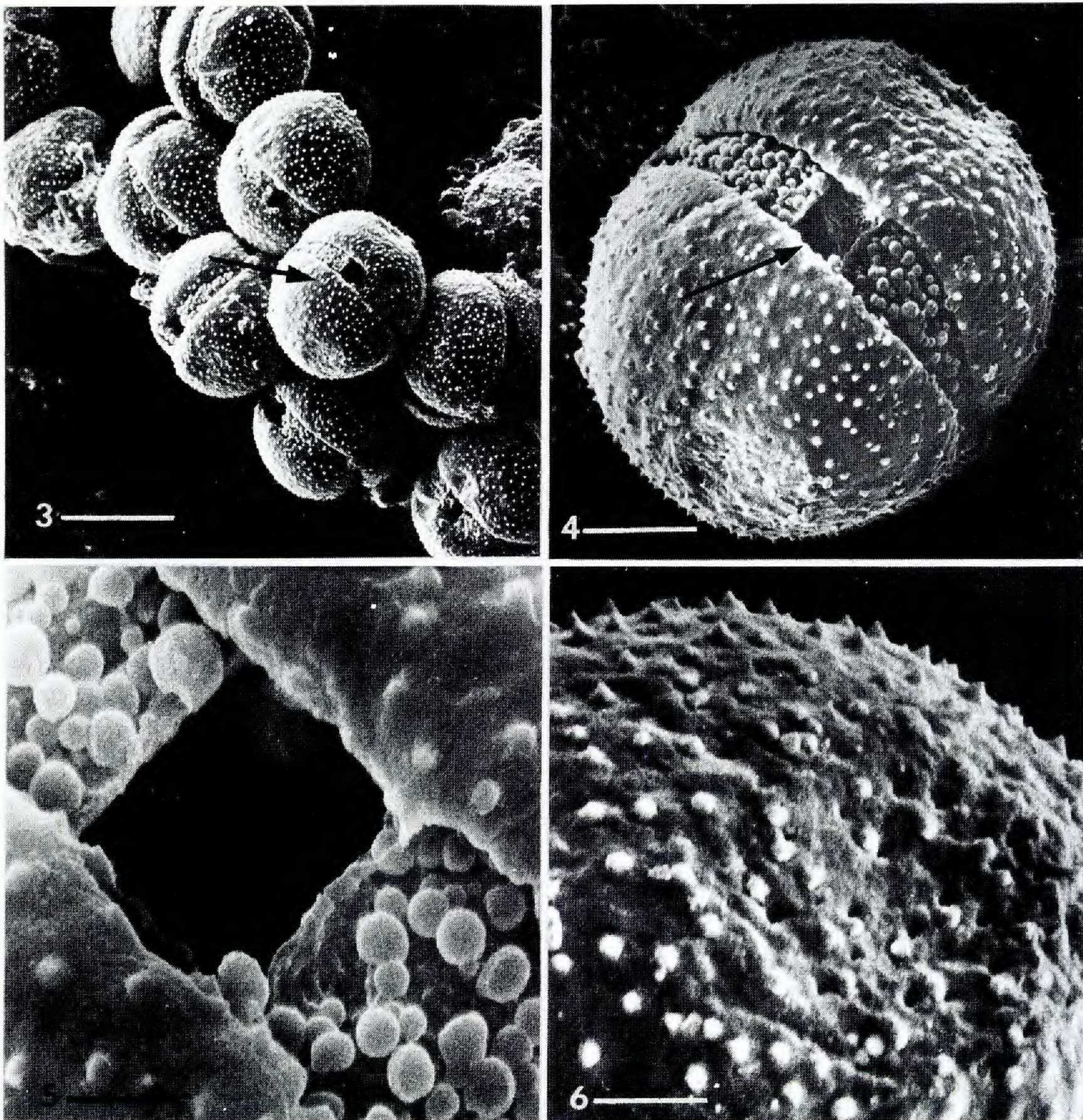


FIGURE 2. Pollen. A–D, *Perezia eryngioides* (from Smith & Klein 7777): A, equatorial view, $\times 1250$; B, polar view, $\times 1250$; C, cross section showing exine stratification, $\times 2000$; D, pattern formed by bacula of tectum, $\times 2000$. E–I, *Trixis alata* (from Fröderstrom & Hultén 202): E, equatorial view, $\times 1250$; F, membrane of colpi with spherical processes, $\times 2000$; G, cross section showing exine stratification, $\times 2000$; H, pattern formed by bacula of tectum, $\times 2000$; I, pattern formed by bacula of infratectum, $\times 2000$.



FIGURES 3–6. Scanning electron micrographs of pollen of *Perezia eryngioides* (from *Smith & Klein 7777*): 3, several acetylated grains, arrow indicates the one shown in Figure 4, scale bar = ca. 20 μm .; 4, equatorial view, arrow pointing toward germ pore shown in Figure 5, scale bar = ca. 6.5 μm .; 5, germ pore and portion of surface of membrane of colpi (showing spherical processes), scale bar = ca. 2 μm .; 6, surface, showing conical spinules, scale bar = ca. 2.5 μm .

mm. long, 1–1.5 mm. wide, covered with double hairs. Pappus of numerous dark brown setose hairs, 7–10 mm. long, in 2 series.

Pubescence of two kinds of trichomes: (1) *glandular biseriata* (25–50 μm .) — multicelled (borne on leaves, stem, receptacle, involucre, and sparsely on the achenes); and (2) *double hairs* or “Zwillingshaare” (Hess, 1938) (120–150 μm .) — two cells joined along their inner walls but not meeting at the apices, copper colored (on the achenes).

POLLEN. Grains 3-colporate, exceptionally parasyncolpate, spheroidal-oblate to spheroidal-prolate, $28\text{--}34 \times 29\text{--}35 \mu\text{m}$. Apocolpium 2.5–3.5 μm . in diameter, slightly prominent to plane, rarely slightly depressed. Colpi

3–4.5 μm . wide, with margins entire or slightly curled, extremes obtuse to acute; membrane of the colpi with notable spherical processes, 0.5–1.2 μm . in diameter. Lalongate ora 2.3–5 μm . in external polar diameter, 4.7–5 μm . in internal polar diameter, and 10–16 μm . in equatorial diameter; equatorial extremes acute. Amb rounded. Exine crassisexinous, pertectate, spinulose, 2.5–3 μm . thick at the pole, 3–5 μm . at the equator. Spinules conical, ca. 0.5 μm . high. Terminal membrane ca. 0.5 μm . thick. Bacula usually laterally fused, forming curled internal walls and leaving spaces of labyrinthic shape. Tectum and infractectum separated from each other by a thin layer not parallel to the nexine (zigzag). Infractectum 1–1.3 μm . thick, baculate in a similar fashion to the tectum. Nexine ca. 0.7 μm . thick.

DISTRIBUTION. Southeastern Brazil, province of Santa Catarina, in Bom Retiro, Irani, and Lajes municípios, from 700 to 1700 meters altitude. Flowering from October to December.

SPECIMENS EXAMINED. **Brazil.** SANTA CATARINA: Bom Retiro, Fazenda Campo dos Padres, dwarf forest, 1650 m., *L. B. Smith & R. M. Klein 7777* (LP, holotype of *Trixis eryngioides* Cabrera); Lajes, Painel banhado, 950 m., *Klein 4566* (LP); Irani, Campo de Irani, bog, 700–900 m., *Smith & Klein 13031* (LP).

Perezia eryngioides has been collected very few times and seems to be rare. It is found in humid places in the western zone of the “campo” or prairie flora (Smith, 1962) of southern Brazil.

RELATIONSHIPS OF PEREZIA ERYNGIOIDES

Perezia eryngioides is a member of tribe Mutisieae subtribe Nassauviinae, which has characteristic bilabiate corollas with the outer lip three-toothed and the inner lip bifid; anthers long tailed at the base; and style bifid with branches truncate at the apex (Crisci, 1974).

Perezia eryngioides was described as a species of *Trixis*; it is, however, very different from the other species of this genus, as is indicated in TABLE 1.

In addition to the criteria shown in TABLE 1, there are a number of other features that may be labeled “tendencies” common to some species of *Trixis* but from which there are exceptions: pubescence including woolly trichomes, capitula with less than 15 flowers each, leaves very short-petiolate or sessile.

Trixis P. Browne¹ is a genus of about 50 species of shrubs occurring from Mexico to central Argentina and in the West Indies. There are two centers of diversity, one in southwestern Mexico, the other in southern Brazil, northern Argentina, and Uruguay (Anderson, 1972; Cabrera, 1936; Loja, 1969).

Perezia eryngioides is better placed in *Perezia* since it shares with the species of this genus an herbaceous habit, basal rosettes, achenial trichomes, white corollas (in *Perezia* the color of corollas is variable but

¹ Hist. Jamaica, 312. 1756. TYPE SPECIES: *Trixis inula* Crantz.

TABLE 1. A comparison of the genus *Trixis* and *Perezia eryngioides*.

	<i>Trixis</i>	<i>Perezia eryngioides</i>
HABIT	Shrubs; not rosette plants	Perennial herbs; rosette plants
COROLLA	Bright yellow	White
DOUBLE HAIRS ON ACHENES	Colorless, ca. 150–200 μm . long, oblong in shape, obtuse at apex, less than 5 times longer than wide, releasing mucilage when wet	Copper colored, ca. 120–150 μm . long, linear in shape, short-bifid at apex, at least 20 times longer than wide, not releasing mucilage when wet
POLLEN	Prolate (rarely subprolate); exine with infratectum thicker than tectum and separated from it by a thick layer parallel to nexine (see FIGURE 2)	Oblate-spheroidal to prolate-spheroidal; exine with tectum thicker than infratectum and separated from it by a thin layer not parallel to the nexine (zigzag)

never bright yellow), and pollen morphology, including exine stratification. Also, both have more than 15 flowers per capitulum.

Perezia Lagasca² is a genus of 32 species of herbs, 27 occurring in the Andean region of South America and 5 (including *P. eryngioides*) in lowland open woods of Paraguay, Uruguay, Brazil, and Argentina (Vuilleumier, 1969; Cabrera & Klein, 1973; Crisci, 1974).

Vuilleumier (1969; 1973 as B. Simpson) clustered the species of *Perezia* into six well-defined groups: Prenanthoides, Coerulescens, Magellanica, Recurvata, Pungens, and Multiflora.

One of the most distinctive and well-defined groups centers around *Perezia multiflora* and consists of four species: *P. multiflora* (H. & B.) Less. (with 2 subspecies, *multiflora* and *sonchifolia*); *P. squarrosa* (Vahl) Less. (with 2 subspecies, *squarrosa* and *cubataensis*); *P. kingii* Baker, and a species described since Vuilleumier's paper, *P. catharinensis* Cabrera. All of the species of this assemblage are found exclusively or have populations in the Paraguay-southern Brazil-Uruguay basin, although *P. multiflora* itself has its main center of distribution in the high, dry puna of Peru and Bolivia.

Within the genus, the four species of this group share the unusual characters of silky, copper-colored achenial trichomes, reduced number of involucre bracts, pubescence on the receptacle, and small pollen size (24–30 μm .). In addition, there are a number of features that are not exclusive to the Multiflora group such as small head size, compacted head clusters, taproots rather than rhizomatous rootstocks, and spiniferous foliage.

Members of the Multiflora group possess the lowest chromosome numbers in the genus, including the probable base number $x = 4$ (Vuilleu-

² Am. Nat. 1: 311. 1811. TYPE SPECIES: *Perezia magellanica* (L. f.) Lagasca (= *Perdium magellanicum* L. f.).

mier, 1969), suggesting that this group is a primitive one in the genus. However, as was pointed out by Vuilleumier (*op. cit.*), it does not appear to represent the basal complex, but seems rather to be a closely knit cluster of species that radiates in southeastern Brazil from a very early offshoot of the main ancestral stock.

Perezia eryngioides belongs to the Multiflora group since it possesses all the characters that define the assemblage.

Although the Multiflora group is a very tightly knit assemblage, *Perezia eryngioides* seems to be more closely related to *P. squarrosa* (especially subsp. *cubataensis*) than either of these two species is to *P. kingii*, *P. catharinensis*, or *P. multiflora*. The two taxa are sympatric in the *P. eryngioides* range and can be distinguished on the bases of corolla color and basal leaf size. *Perezia squarrosa* is found in humid places in southern Brazil, Paraguay, and Uruguay, at low elevations and even at sea level.

To summarize, we can establish that *Perezia eryngioides* is easily distinguished from all the species of *Trixis* by its herbaceous habit, white corollas, characteristic achenial trichomes, and pollen morphology, including exine stratification. It shares these characters with the species of the genus *Perezia*. From most of the species of *Perezia*, it can be distinguished by the color of its achenial trichomes, the reduced number of involucre bracts, the pubescence of the receptacle, and the small size of its pollen grains, characters it shares with *P. multiflora*, *P. kingii*, *P. catharinensis*, and *P. squarrosa*. It can be distinguished from these four species as shown in the following key.

- A. Capitula less than 10 mm. long.
 - B. Involucre bracts with small white spines near the base; pappus pure white. *P. kingii*.
 - B. Involucre bracts without spines; pappus brown. *P. catharinensis*.
- A. Capitula longer than 10 mm.
 - C. Capitula hemispheric; florets bicolored, with yellow on the inner part of the corolla tube and the inner petals; heads often congested. *P. multiflora*.
 - C. Capitula campanulate; florets monochromatic; heads in a loose cyme.
 - D. Basal leaves 4–20 cm. long, 0.5–2.5 cm. wide; corollas blue, violet, or reddish. *P. squarrosa*.
 - D. Basal leaves 20–34 cm. long, 3–4 cm. wide; corollas white. *P. eryngioides*.

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